

Pxe.st25
SEQUENCE LISTING

<110> PXE International, Inc.
University of Hawaii

<120> Mutations in a gene encoding an ABC transporter (MRP6) causing
Pseudoxanthoma Elasticum

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<170> PatentIn version 3.0

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Pxe.st25

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Pxe.st25

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Pxe.st25

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Pxe.st25

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5

10

15

aca gag cct gaa cct gcc gcc acc agc ctg ctg agc ctg tgc ttc ctg

96

Thr Glu Pro Glu Pro Ala Ala Thr Ser Leu Leu Ser Leu Cys Phe Leu

20

25

30

aga aca gca ggg gtc tgg gta ccc ccc atg tac ctc tgg gtc ctt ggt

44

Arg Thr Ala Gly Val Trp Val Pro Pro Met Tyr Leu Trp Val Leu Gly

35

40

45

1

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92

Pro Ile Tyr Leu Leu Phe Ile His His His Gly Arg Gly Tyr Leu Trp

50

55

60

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Met Ser Pro Leu Phe Lys Ala Lys Met Val Leu Gly Phe Ala Leu Ile

65

70

75

80

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88

Val Leu Cys Thr Ser Ser Val Ala Val Ala Leu Trp Lys Ile Gln Gln

85

90

95

2

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3

Pxe.st25

36

Gly Thr Pro Glu Ala Pro Glu Phe Leu Ile His Pro Thr Val Trp Leu

100

105

110

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84

Thr Thr Met Ser Phe Ala Val Phe Leu Ile His Thr Glu Arg Lys Lys

115

120

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Val Leu Pro Ala Thr Asn Ala Ala Gln Gln Ala Ser Gly Ala Gly Phe

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76

Val Val Ala Gln Phe Val Leu Ser Cys Leu Ala Asp Gln Pro Pro Phe

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185

190

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24

Phe Pro Glu Asp Pro Gln Gln Ser Asn Pro Cys Pro Glu Thr Gly Ala

195

200

205

Pxe.st25

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72

Ala Phe Pro Ser Lys Ala Thr Phe Trp Trp Val Ser Gly Leu Val Trp

220

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Arg Gly Tyr Arg Arg Pro Leu Arg Pro Lys Asp Leu Trp Ser Leu Gly

240

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68

Arg Glu Asn Ser Ser Glu Glu Leu Val Ser Arg Leu Glu Lys Glu Trp

255

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16

Met Arg Asn Arg Ser Ala Ala Arg Arg His Asn Lys Ala Ile Ala Phe

270

aaa agg aaa ggc ggc agt ggc atg aag gct cca gag acc gag ccc ttc. 8
64

Lys Arg Lys Gly Gly Ser Gly Met Lys Ala Pro Glu Thr Glu Pro Phe

285

cta cgg caa gaa ggg agc cag tgg cgc cca ctg ctg aag gcc atc tgg 9
12

Leu Arg Gln Glu Gly Ser Gln Trp Arg Pro Leu Leu Lys Ala Ile Trp

300

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Gln Val Phe His Ser Thr Phe Leu Leu Gly Thr Leu Ser Leu Ile Ile

320

1

08

Ser Asp Val Phe Arg Phe Thr Val Pro Lys Leu Leu Ser Leu Phe Leu

335

56

Glu Phe Ile Gly Asp Pro Lys Pro Pro Ala Trp Lys Gly Tyr Leu Leu

350

04

Ala Val Leu Met Phe Leu Ser Ala Cys Leu Gln Thr Leu Phe Glu Gln

365

52

Gln Asn Met Tyr Arg Leu Lys Val Leu Gln Met Arg Leu Arg Ser Ala

380

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Ile Thr Gly Leu Val Tyr Arg Lys Val Leu Ala Leu Ser Ser Gly Ser

385

395

400

48

Arg Lys Ala Ser Ala Val Gly Asp Val Val Asn Leu Val Ser Val Asp

415

96

Val Gln Arg Leu Thr Glu Ser Val Leu Tyr Leu Asn Gly Leu Trp Leu

430

Pxe.st25

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Gly Pro Ser Ala Leu Thr Ala Ile Ala Val Phe Leu Ser Leu Leu Pro	
450 455 460	
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Leu Asn Phe Phe Ile Ser Lys Lys Arg Asn His His Gln Glu Glu Gln	
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Asn Ser Lys Thr Ile Lys Phe His Gly Trp Glu Gly Ala Phe Leu Asp	
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Gly Leu Leu Phe Ser Val Ser Leu Val Ser Phe Gln Val Ser Thr Phe	

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Ala Met Asn Ala Glu Lys Ala Phe Val Thr Leu Thr Val Leu Asn Ile			
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	595	600	605
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Gly Lys Asp Cys Ile Thr Ile His Ser Ala Thr Phe Ala Trp Ser Gln			
	625	630	635
625	630	635	640
gaa agc cct ccc tgc ctc cac aga ata aac ctc acg gtg ccc cag ggc			19
68			
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Pxe.st25

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660	665	670	
ctg tcc gcc ctc ctt ggg gag ctg tca aag gtg gag ggg ttc gtg agc	20		
64			
Leu Ser Ala Leu Leu Gly Glu Leu Ser Lys Val Glu Gly Phe Val Ser			
675	680	685	
atc gag ggt gct gtg gcc tac gtg ccc cag gag gcc tgg gtg cag aac	21		
12			
Ile Glu Gly Ala Val Ala Tyr Val Pro Gln Glu Ala Trp Val Gln Asn			
690	695	700	
acc tct gtg gta gag aat gtg tgc ttc ggg cag gag ctg gac cca ccc	21		
60			
Thr Ser Val Val Glu Asn Val Cys Phe Gly Gln Glu Leu Asp Pro Pro			
705	710	715	720
tgg ctg gag aga gta cta gaa gcc tgt gcc ctg cag cca gat gtg gac	22		
08			
Trp Leu Glu Arg Val Leu Glu Ala Cys Ala Leu Gln Pro Asp Val Asp			
725	730	735	
agc ttc cct gag gga atc cac act tca att ggg gag cag ggc atg aat	22		
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Ser Phe Pro Glu Gly Ile His Thr Ser Ile Gly Glu Gln Gly Met Asn			
740	745	750	
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Pxe.st25

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755

760

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23

52

Arg Lys Ala Ala Val Tyr Leu Leu Asp Asp Pro Leu Ala Ala Leu Asp

770

775

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24

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Ala His Val Gly Gln His Val Phe Asn Gln Val Ile Gly Pro Gly Gly

785

790

795

800

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24

48

Leu Leu Gln Gly Thr Thr Arg Ile Leu Val Thr His Ala Leu His Ile

805

810

815

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24

96

Leu Pro Gln Ala Asp Trp Ile Ile Val Leu Ala Asn Gly Ala Ile Ala

820

825

830

gag atg ggt tcc tac cag gag ctt ctg cag agg aag ggg gcc ctc gtg

25

44

Glu Met Gly Ser Tyr Gln Glu Leu Leu Gln Arg Lys Gly Ala Leu Val

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840

845

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25

92

Cys Leu Leu Asp Gln Ala Arg Gln Pro Gly Asp Arg Gly Glu Gly Glu

850

855

860

aca gaa cct ggg acc agc acc aag gac ccc aga ggc acc tct gca ggc

26

Pxe.st25

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Thr Glu Pro Gly Thr Ser Thr Lys Asp Pro Arg Gly Thr Ser Ala Gly

865

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875

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Arg Arg Pro Glu Leu Arg Arg Glu Arg Ser Ile Lys Ser Val Pro Glu

885

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895

aag gac cgt acc act tca gaa gcc cag aca gag gtt cct ctg gat gac

36

Lys Asp Arg Thr Thr Ser Glu Ala Gln Thr Glu Val Pro Leu Asp Asp

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905

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Pro Asp Arg Ala Gly Trp Pro Ala Gly Lys Asp Ser Ile Gln Tyr Gly

915

920

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Arg Val Lys Ala Thr Val His Leu Ala Tyr Leu Arg Ala Val Gly Thr

930

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ccc ctc tgc ctc tac gca ctc ttc ctc ttc ctc tgc cag caa gtg gcc

80

Pro Leu Cys Leu Tyr Ala Leu Phe Leu Phe Leu Cys Gln Gln Val Ala

945

950

955

960

tcc ttc tgc cgg ggc tac tgg ctg agc ctg tgg gcg gac gac cct gca

28

Ser Phe Cys Arg Gly Tyr Trp Leu Ser Leu Trp Ala Asp Asp Pro Ala

965

970

975

Pxe.st25

gta ggt ggg cag cag acg cag gca gcc ctg cgt ggc ggg atc ttc ggg 29
76

Val Gly Gly Gln Gln Thr Gln Ala Ala Leu Arg Gly Gly Ile Phe Gly

980

985

990

ctc ctc ggc tgt ctc caa gcc att ggg ctg ttt gcc tcc atg gct gcg 30
24

Leu Leu Gly Cys Leu Gln Ala Ile Gly Leu Phe Ala Ser Met Ala Ala

995

1000

1005

gtg ctc cta ggt ggg gcc cgg gca tcc agg ttg ctc ttc cag agg 30
69

Val Leu Leu Gly Gly Ala Arg Ala Ser Arg Leu Leu Phe Gln Arg

1010

1015

1020

ctc ctg tgg gat gtg gtg cga tct ccc atc agc ttc ttt gag cgg 31
14

Leu Leu Trp Asp Val Val Arg Ser Pro Ile Ser Phe Phe Glu Arg

1025

1030

1035

aca ccc att ggt cac ctg cta aac cgc ttc tcc aag gag aca gac 31
59

Thr Pro Ile Gly His Leu Leu Asn Arg Phe Ser Lys Glu Thr Asp

1040

1045

1050

acg gtt gac gtg gac att cca gac aaa ctc cgg tcc ctg ctg atg 32
04

Thr Val Asp Val Asp Ile Pro Asp Lys Leu Arg Ser Leu Leu Met

1055

1060

1065

tac gcc ttt gga ctc ctg gag gtc agc ctg gtg gtg gca gtg gct 32
49

Tyr Ala Phe Gly Leu Leu Glu Val Ser Leu Val Val Ala Val Ala

1070

1075

1080

Pxe.st25

acc cca ctg gcc act gtg gcc atc ctg cca ctg ttt ctc ctc tac	32
94	
Thr Pro Leu Ala Thr Val Ala Ile Leu Pro Leu Phe Leu Leu Tyr	
1085 1090 1095	
gct ggg ttt cag agc ctg tat gtg gtt agc tca tgc cag ctg aga	33
39	
Ala Gly Phe Gln Ser Leu Tyr Val Val Ser Ser Cys Gln Leu Arg	
1100 1105 1110	
cgc ttg gag tca gcc agc tac tcg tct gtc tgc tcc cac atg gct	33
84	
Arg Leu Glu Ser Ala Ser Tyr Ser Ser Val Cys Ser His Met Ala	
1115 1120 1125	
gag acg ttc cag ggc agc aca gtg gtc cgg gca ttc' cga acc cag	34
29	
Glu Thr Phe Gln Gly Ser Thr Val Val Arg Ala Phe Arg Thr Gln	
1130 1135 1140	
gcc ccc ttt gtg gct cag aac aat gct cgc gta gat gaa agc cag	34
74	
Ala Pro Phe Val Ala Gln Asn Asn Ala Arg Val Asp Glu Ser Gln	
1145 1150 1155	
agg atc agt ttc ccg cga ctg gtg gct gac agg tgg ctt gcg gcc	35
19	
Arg Ile Ser Phe Pro Arg Leu Val Ala Asp Arg Trp Leu Ala Ala	
1160 1165 1170	
aat gtg gag ctc ctg ggg aat ggc ctg gtg ttt gca gct gcc acg	35
64	
Asn Val Glu Leu Leu Gly Asn Gly Leu Val Phe Ala Ala Ala Thr	
1175 1180 1185	

Pxe.st25

tgt gct	gtg ctg agc aaa gcc	cac ctc agt gct ggc	ctc gtg ggc	36
09				
Cys Ala	Val Leu Ser Lys Ala	His Leu Ser Ala Gly	Leu Val Gly	
1190	1195	1200		
ttc tct	gtc tct gct gcc ctc	cag gtg acc cag aca	ctg cag tgg	36
54				
Phe Ser	Val Ser Ala Ala Leu	Gln Val Thr Gln Thr	Leu Gln Trp	
1205	1210	1215		
gtt gtt	cgc aac tgg aca gac	cta gag aac agc atc	gtg tca gtg	36
99				
Val Val	Arg Asn Trp Thr Asp	Leu Glu Asn Ser Ile	Val Ser Val	
1220	1225	1230		
gag cgg	atg cag gac tat gcc	tgg acg ccc aag gag	gct ccc tgg	37
44				
Glu Arg	Met Gln Asp Tyr Ala	Trp Thr Pro Lys Glu	Ala Pro Trp	
1235	1240	1245		
agg ctg	ccc aca tgt gca gct	cag ccc ccc tgg cct	cag ggc ggg	37
89				
Arg Leu	Pro Thr Cys Ala Ala	Gln Pro Pro Trp Pro	Gln Gly Gly	
1250	1255	1260		
cag atc	gag ttc cgg gac ttt	ggg cta aga tac cga	cct gag ctc	38
34				
Gln Ile	Glu Phe Arg Asp Phe	Gly Leu Arg Tyr Arg	Pro Glu Leu	
1265	1270	1275		
ccg ctg	gct gtg cag ggc gtg	tcc ttc aag atc cac	gca gga gag	38
79				
Pro Leu	Ala Val Gln Gly Val	Ser Phe Lys Ile His	Ala Gly Glu	

Pxe.st25

1280		1285		1290	
aag gtg ggc atc gtt ggc agg acc ggg gca ggg aag tcc tcc ctg	39				
24					
Lys Val Gly Ile Val Gly Arg Thr Gly Ala Gly Lys Ser Ser Leu					
1295		1300		1305	
gcc agt ggg ctg ctg cgg ctc cag gag gca gct gag ggt ggg atc	39				
69					
Ala Ser Gly Leu Leu Arg Leu Gln Glu Ala Ala Glu Gly Gly Ile					
1310		1315		1320	
tgg atc gac ggg gtc ccc att gcc cac gtg ggg ctg cac aca ctg	40				
14					
Trp Ile Asp Gly Val Pro Ile Ala His Val Gly Leu His Thr Leu					
1325		1330		1335	
cgc tcc agg atc agc atc atc ccc cag gac ccc atc ctg ttc cct	40				
59					
Arg Ser Arg Ile Ser Ile Ile Pro Gln Asp Pro Ile Leu Phe Pro					
1340		1345		1350	
ggc tct ctg cgg atg aac ctc gac ctg ctg cag gag cac tcg gac	41				
04					
Gly Ser Leu Arg Met Asn Leu Asp Leu Leu Gln Glu His Ser Asp					
1355		1360		1365	
gag gct atc tgg gca gcc ctg gag acg gtg cag ctc aaa gcc ttg	41				
49					
Glu Ala Ile Trp Ala Ala Leu Glu Thr Val Gln Leu Lys Ala Leu					
1370		1375		1380	
gtg gcc agc ctg ccc ggc cag ctg cag tac aag tgt gct gac cga	41				
94					
Val Ala Ser Leu Pro Gly Gln Leu Gln Tyr Lys Cys Ala Asp Arg					

Pxe.st25

1385	1390	1395	
ggc gag gac ctg agc gtg ggc	cag aaa cag ctc ctg	tgt ctg gca	42
39 Gly Glu Asp Leu Ser Val Gly	Gln Lys Gln Leu Leu	Cys Leu Ala	
1400	1405	1410	
cgt gcc ctt ctc cgg aag acc	cag atc ctc atc ctg	gac gag gct	42
84 Arg Ala Leu Leu Arg Lys Thr	Gln Ile Leu Ile Leu	Asp Glu Ala	
1415	1420	1425	
act gct gcc gtg gac cct ggc	acg gag ctg cag atg	cag gcc atg	43
29 Thr Ala Ala Val Asp Pro Gly	Thr Glu Leu Gln Met	Gln Ala Met	
1430	1435	1440	
ctc ggg agc tgg ttt gca cag	tgc act gtg ctg ctc	att gcc cac	43
74 Leu Gly Ser Trp Phe Ala Gln	Cys Thr Val Leu Leu	Ile Ala His	
1445	1450	1455	
cgc ctg cgc tcc gtg atg gac	tgt gcc cgg gtt ctg	gtc atg gac	44
19 Arg Leu Arg Ser Val Met Asp	Cys Ala Arg Val Leu	Val Met Asp	
1460	1465	1470	
aag ggg cag gtg gca gag agc	ggc agc ccg gcc cag	ctg ctg gcc	44
64 Lys Gly Gln Val Ala Glu Ser	Gly Ser Pro Ala Gln	Leu Leu Ala	
1475	1480	1485	
cag aag ggc ctg ttt tac aga	ctg gcc cag gag tca	ggc ctg gtc	45
09			

Pxe.st25

Gln Lys Gly Leu Phe Tyr Arg Leu Ala Gln Glu Ser Gly Leu Val

1490

1495

1500

tga
12

45

<210> 3
<211> 1503
<212> PRT
<213> Homo sapiens

<400> 3

Met Ala Ala Pro Ala Glu Pro Cys Ala Gly Gln Gly Val Trp Asn Gln
1 5 10 15

Thr Glu Pro Glu Pro Ala Ala Thr Ser Leu Leu Ser Leu Cys Phe Leu
20 25 30

Arg Thr Ala Gly Val Trp Val Pro Pro Met Tyr Leu Trp Val Leu Gly
35 40 45

Pro Ile Tyr Leu Leu Phe Ile His His His Gly Arg Gly Tyr Leu Trp
50 55 60

Met Ser Pro Leu Phe Lys Ala Lys Met Val Leu Gly Phe Ala Leu Ile
65 70 75 80

Val Leu Cys Thr Ser Ser Val Ala Val Ala Leu Trp Lys Ile Gln Gln
85 90 95

Gly Thr Pro Glu Ala Pro Glu Phe Leu Ile His Pro Thr Val Trp Leu
100 105 110

Thr Thr Met Ser Phe Ala Val Phe Leu Ile His Thr Glu Arg Lys Lys
115 120 125

Pxe.st25

Gly Val Gln Ser Ser Gly Val Leu Phe Gly Tyr Trp Leu Leu Cys Phe
130 135 140

Val Leu Pro Ala Thr Asn Ala Ala Gln Gln Ala Ser Gly Ala Gly Phe
145 150 155 160

Gln Ser Asp Pro Val Arg His Leu Ser Thr Tyr Leu Cys Leu Ser Leu
165 170 175

Val Val Ala Gln Phe Val Leu Ser Cys Leu Ala Asp Gln Pro Pro Phe
180 185 190

Phe Pro Glu Asp Pro Gln Gln Ser Asn Pro Cys Pro Glu Thr Gly Ala
195 200 205

Ala Phe Pro Ser Lys Ala Thr Phe Trp Trp Val Ser Gly Leu Val Trp
210 215 220

Arg Gly Tyr Arg Arg Pro Leu Arg Pro Lys Asp Leu Trp Ser Leu Gly
225 230 235 240

Arg Glu Asn Ser Ser Glu Glu Leu Val Ser Arg Leu Glu Lys Glu Trp
245 250 255

Met Arg Asn Arg Ser Ala Ala Arg Arg His Asn Lys Ala Ile Ala Phe
260 265 270

Lys Arg Lys Gly Gly Ser Gly Met Lys Ala Pro Glu Thr Glu Pro Phe
275 280 285

Leu Arg Gln Glu Gly Ser Gln Trp Arg Pro Leu Leu Lys Ala Ile Trp
290 295 300

Gln Val Phe His Ser Thr Phe Leu Leu Gly Thr Leu Ser Leu Ile Ile
305 310 315 320

Pxe.st25

Ser Asp Val Phe Arg Phe Thr Val Pro Lys Leu Leu Ser Leu Phe Leu
325 330 335

Glu Phe Ile Gly Asp Pro Lys Pro Pro Ala Trp Lys Gly Tyr Leu Leu
340 345 350

Ala Val Leu Met Phe Leu Ser Ala Cys Leu Gln Thr Leu Phe Glu Gln
355 360 365

Gln Asn Met Tyr Arg Leu Lys Val Leu Gln Met Arg Leu Arg Ser Ala
370 375 380

Ile Thr Gly Leu Val Tyr Arg Lys Val Leu Ala Leu Ser Ser Gly Ser
385 390 395 400

Arg Lys Ala Ser Ala Val Gly Asp Val Val Asn Leu Val Ser Val Asp
405 410 415

Val Gln Arg Leu Thr Glu Ser Val Leu Tyr Leu Asn Gly Leu Trp Leu
420 425 430

Pro Leu Val Trp Ile Val Val Cys Phe Val Tyr Leu Trp Gln Leu Leu
435 440 445

Gly Pro Ser Ala Leu Thr Ala Ile Ala Val Phe Leu Ser Leu Leu Pro
450 455 460

Leu Asn Phe Phe Ile Ser Lys Lys Arg Asn His His Gln Glu Glu Gln
465 470 475 480

Met Arg Gln Lys Asp Ser Arg Ala Arg Leu Thr Ser Ser Ile Leu Arg
485 490 495

Asn Ser Lys Thr Ile Lys Phe His Gly Trp Glu Gly Ala Phe Leu Asp
500 505 510

Pxe.st25

Arg Val Leu Gly Ile Arg Gly Gln Glu Leu Gly Ala Leu Arg Thr Ser
515 520 525

Gly Leu Leu Phe Ser Val Ser Leu Val Ser Phe Gln Val Ser Thr Phe
530 535 540

Leu Val Ala Leu Val Val Phe Ala Val His Thr Leu Val Ala Glu Asn
545 550 555 560

Ala Met Asn Ala Glu Lys Ala Phe Val Thr Leu Thr Val Leu Asn Ile
565 570 575

Leu Asn Lys Ala Gln Ala Phe Leu Pro Phe Ser Ile His Ser Leu Val
580 585 590

Gln Ala Arg Val Ser Phe Asp Arg Leu Val Thr Phe Leu Cys Leu Glu
595 600 605

Glu Val Asp Pro Gly Val Val Asp Ser Ser Ser Ser Gly Ser Ala Ala
610 615 620

Gly Lys Asp Cys Ile Thr Ile His Ser Ala Thr Phe Ala Trp Ser Gln
625 630 635 640

Glu Ser Pro Pro Cys Leu His Arg Ile Asn Leu Thr Val Pro Gln Gly
645 650 655

Cys Leu Leu Ala Val Val Gly Pro Val Gly Ala Gly Lys Ser Ser Leu
660 665 670

Leu Ser Ala Leu Leu Gly Glu Leu Ser Lys Val Glu Gly Phe Val Ser
675 680 685

Ile Glu Gly Ala Val Ala Tyr Val Pro Gln Glu Ala Trp Val Gln Asn
690 695 700

Pxe.st25

Thr Ser Val Val Glu Asn Val Cys Phe Gly Gln Glu Leu Asp Pro Pro
705 710 715 720

Trp Leu Glu Arg Val Leu Glu Ala Cys Ala Leu Gln Pro Asp Val Asp
725 730 735

Ser Phe Pro Glu Gly Ile His Thr Ser Ile Gly Glu Gln Gly Met Asn
740 745 750

Leu Ser Gly Gly Gln Lys Gln Arg Leu Ser Leu Ala Arg Ala Val Tyr
755 760 765

Arg Lys Ala Ala Val Tyr Leu Leu Asp Asp Pro Leu Ala Ala Leu Asp
770 775 780

Ala His Val Gly Gln His Val Phe Asn Gln Val Ile Gly Pro Gly Gly
785 790 795 800

Leu Leu Gln Gly Thr Thr Arg Ile Leu Val Thr His Ala Leu His Ile
805 810 815

Leu Pro Gln Ala Asp Trp Ile Ile Val Leu Ala Asn Gly Ala Ile Ala
820 825 830

Glu Met Gly Ser Tyr Gln Glu Leu Leu Gln Arg Lys Gly Ala Leu Val
835 840 845

Cys Leu Leu Asp Gln Ala Arg Gln Pro Gly Asp Arg Gly Glu Gly Glu
850 855 860

Thr Glu Pro Gly Thr Ser Thr Lys Asp Pro Arg Gly Thr Ser Ala Gly
865 870 875 880

Arg Arg Pro Glu Leu Arg Arg Glu Arg Ser Ile Lys Ser Val Pro Glu
885 890 895

Pxe.st25

Lys Asp Arg Thr Thr Ser Glu Ala Gln Thr Glu Val Pro Leu Asp Asp
 900 905 910

Pro Asp Arg Ala Gly Trp Pro Ala Gly Lys Asp Ser Ile Gln Tyr Gly
 915 920 925

Arg Val Lys Ala Thr Val His Leu Ala Tyr Leu Arg Ala Val Gly Thr
 930 935 940

Pro Leu Cys Leu Tyr Ala Leu Phe Leu Phe Leu Cys Gln Gln Val Ala
 945 950 955 960

Ser Phe Cys Arg Gly Tyr Trp Leu Ser Leu Trp Ala Asp Asp Pro Ala
 965 970 975

Val Gly Gly Gln Gln Thr Gln Ala Ala Leu Arg Gly Gly Ile Phe Gly
 980 985 990

Leu Leu Gly Cys Leu Gln Ala Ile Gly Leu Phe Ala Ser Met Ala Ala
 995 1000 1005

Val Leu Leu Gly Gly Ala Arg Ala Ser Arg Leu Leu Phe Gln Arg
 1010 1015 1020

Leu Leu Trp Asp Val Val Arg Ser Pro Ile Ser Phe Phe Glu Arg
 1025 1030 1035

Thr Pro Ile Gly His Leu Leu Asn Arg Phe Ser Lys Glu Thr Asp
 1040 1045 1050

Thr Val Asp Val Asp Ile Pro Asp Lys Leu Arg Ser Leu Leu Met
 1055 1060 1065

Tyr Ala Phe Gly Leu Leu Glu Val Ser Leu Val Val Ala Val Ala
 1070 1075 1080

Pxe.st25

Thr	Pro	Leu	Ala	Thr	Val	Ala	Ile	Leu	Pro	Leu	Phe	Leu	Leu	Tyr
	1085					1090					1095			
Ala	Gly	Phe	Gln	Ser	Leu	Tyr	Val	Val	Ser	Ser	Cys	Gln	Leu	Arg
	1100					1105					1110			
Arg	Leu	Glu	Ser	Ala	Ser	Tyr	Ser	Ser	Val	Cys	Ser	His	Met	Ala
	1115					1120					1125			
Glu	Thr	Phe	Gln	Gly	Ser	Thr	Val	Val	Arg	Ala	Phe	Arg	Thr	Gln
	1130					1135					1140			
Ala	Pro	Phe	Val	Ala	Gln	Asn	Asn	Ala	Arg	Val	Asp	Glu	Ser	Gln
	1145					1150					1155			
Arg	Ile	Ser	Phe	Pro	Arg	Leu	Val	Ala	Asp	Arg	Trp	Leu	Ala	Ala
	1160					1165					1170			
Asn	Val	Glu	Leu	Leu	Gly	Asn	Gly	Leu	Val	Phe	Ala	Ala	Ala	Thr
	1175					1180					1185			
Cys	Ala	Val	Leu	Ser	Lys	Ala	His	Leu	Ser	Ala	Gly	Leu	Val	Gly
	1190					1195					1200			
Phe	Ser	Val	Ser	Ala	Ala	Leu	Gln	Val	Thr	Gln	Thr	Leu	Gln	Trp
	1205					1210					1215			
Val	Val	Arg	Asn	Trp	Thr	Asp	Leu	Glu	Asn	Ser	Ile	Val	Ser	Val
	1220					1225					1230			
Glu	Arg	Met	Gln	Asp	Tyr	Ala	Trp	Thr	Pro	Lys	Glu	Ala	Pro	Trp
	1235					1240					1245			
Arg	Leu	Pro	Thr	Cys	Ala	Ala	Gln	Pro	Pro	Trp	Pro	Gln	Gly	Gly
	1250					1255					1260			

Pxe.st25

Gln	Ile	Glu	Phe	Arg	Asp	Phe	Gly	Leu	Arg	Tyr	Arg	Pro	Glu	Leu
1265						1270					1275			
Pro	Leu	Ala	Val	Gln	Gly	Val	Ser	Phe	Lys	Ile	His	Ala	Gly	Glu
1280						1285					1290			
Lys	Val	Gly	Ile	Val	Gly	Arg	Thr	Gly	Ala	Gly	Lys	Ser	Ser	Leu
1295						1300					1305			
Ala	Ser	Gly	Leu	Leu	Arg	Leu	Gln	Glu	Ala	Ala	Glu	Gly	Gly	Ile
1310						1315					1320			
Trp	Ile	Asp	Gly	Val	Pro	Ile	Ala	His	Val	Gly	Leu	His	Thr	Leu
1325						1330					1335			
Arg	Ser	Arg	Ile	Ser	Ile	Ile	Pro	Gln	Asp	Pro	Ile	Leu	Phe	Pro
1340						1345					1350			
Gly	Ser	Leu	Arg	Met	Asn	Leu	Asp	Leu	Leu	Gln	Glu	His	Ser	Asp
1355						1360					1365			
Glu	Ala	Ile	Trp	Ala	Ala	Leu	Glu	Thr	Val	Gln	Leu	Lys	Ala	Leu
1370						1375					1380			
Val	Ala	Ser	Leu	Pro	Gly	Gln	Leu	Gln	Tyr	Lys	Cys	Ala	Asp	Arg
1385						1390					1395			
Gly	Glu	Asp	Leu	Ser	Val	Gly	Gln	Lys	Gln	Leu	Leu	Cys	Leu	Ala
1400						1405					1410			
Arg	Ala	Leu	Leu	Arg	Lys	Thr	Gln	Ile	Leu	Ile	Leu	Asp	Glu	Ala
1415						1420					1425			
Thr	Ala	Ala	Val	Asp	Pro	Gly	Thr	Glu	Leu	Gln	Met	Gln	Ala	Met
1430						1435					1440			

Pxe.st25

Leu Gly Ser Trp Phe Ala Gln Cys Thr Val Leu Leu Ile Ala His
1445 1450 1455

Arg Leu Arg Ser Val Met Asp Cys Ala Arg Val Leu Val Met Asp
1460 1465 1470

Lys Gly Gln Val Ala Glu Ser Gly Ser Pro Ala Gln Leu Leu Ala
1475 1480 1485

Gln Lys Gly Leu Phe Tyr Arg Leu Ala Gln Glu Ser Gly Leu Val
1490 1495 1500

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<213> Artificial

<220>
<223> PCR primer for ABCC6

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20

<210> 5
<211> 20
<212> DNA
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<220>
<223> PCR primer for ABCC6

<400> 5
ggaggcttgg gatcaccaat
20

<210> 6
<211> 20
<212> DNA
<213> Artificial

<220>

<223> PCR primer for MRP-1

<400> 6
caactgcatc gttctgtttg
20

<210> 7
<211> 20
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<213> Artificial

<220>
<223> PCR primer for MRP-1

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20

<210> 8
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<222> (12)..(4508)
<223> cDNA for mouse MRP6

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50

Met Asn Ser Gly Arg Ser Met Ala Thr Pro Gly Glu Gln

1

5

10

tgc gcc ggc ctg agg gtc tgg aac cag aca gag cag gag cct gcg gcc
98

Cys Ala Gly Leu Arg Val Trp Asn Gln Thr Glu Gln Glu Pro Ala Ala

15

20

25

tat cac ttg ctc agc ctg tgc ttc gtg aga gcc gcc agc agc tgg gtg
46

1

Pxe.st25

Tyr His Leu Leu Ser Leu Cys Phe Val Arg Ala Ala Ser Ser Trp Val

30 35 40 45

ccc ccc atg tac ctc tgg gtc ctc ggc ccc atc tac ctt ctc tac atc 1

94

Pro Pro Met Tyr Leu Trp Val Leu Gly Pro Ile Tyr Leu Leu Tyr Ile

50 55 60

cat cgc cat ggc cgg tgc tac ctc cgg atg tcc cac ctc ttc aaa acc 2

42

His Arg His Gly Arg Cys Tyr Leu Arg Met Ser His Leu Phe Lys Thr

65 70 75

aaa atg gtg ctg ggc ttg gcc ctc atc ctt ctg tat acc ttc aac gtg 2

90

Lys Met Val Leu Gly Leu Ala Leu Ile Leu Leu Tyr Thr Phe Asn Val

80 85 90

gcc gtg cct ctg tgg agg atc cac cag ggc gtg ccc cag gcc cca gag 3

38

Ala Val Pro Leu Trp Arg Ile His Gln Gly Val Pro Gln Ala Pro Glu

95 100 105

ctt cta att cac cct act gtg tgg ctc acc acc atg agc ttt gcc acc 3

86

Leu Leu Ile His Pro Thr Val Trp Leu Thr Thr Met Ser Phe Ala Thr

110 115 120 125

ttt ctg atc cac atg gag aga agg aag gga gtc cgg tca tcc ggg gtg 4

34

Phe Leu Ile His Met Glu Arg Arg Lys Gly Val Arg Ser Ser Gly Val

130 135 140

ttg ttc ggg tac tgg ctg ctc tgc tgc atc ttg cca gga atc aac act 4

Pxe.st25

82

Leu Phe Gly Tyr Trp Leu Leu Cys Cys Ile Leu Pro Gly Ile Asn Thr

145

150

155

gtg cag cag gcc tct gca ggg aac tta cgt cag gag ccc ctc cac cac

30

Val Gln Gln Ala Ser Ala Gly Asn Leu Arg Gln Glu Pro Leu His His

160

165

170

ctg gcc acc tac ctg tgc ttg tcc ctg gtg gtg gct gag ctg gtg ctg

78

Leu Ala Thr Tyr Leu Cys Leu Ser Leu Val Val Ala Glu Leu Val Leu

175

180

185

tcc tgt ctg gtg gac cag cca ccc ttc ttc tcg gaa gac tcc cag cca

26

Ser Cys Leu Val Asp Gln Pro Pro Phe Phe Ser Glu Asp Ser Gln Pro

190

195

200

205

ttg aat ccg tgt cca gag gct gag gcc tcc ttt ccc tcc aag gcc atg

74

Leu Asn Pro Cys Pro Glu Ala Glu Ala Ser Phe Pro Ser Lys Ala Met

210

215

220

ttc tgg tgg gcc tct gga ctg cta tgg agg ggc tac aaa aag ctg ctg

22

Phe Trp Trp Ala Ser Gly Leu Leu Trp Arg Gly Tyr Lys Lys Leu Leu

225

230

235

gga cca aaa gac ctc tgg tca ctt ggg aga gaa aac tct tca gaa gaa

70

Gly Pro Lys Asp Leu Trp Ser Leu Gly Arg Glu Asn Ser Ser Glu Glu

240

245

250

Pxe.st25

ctc gtt tcc cag ctg gaa aga gaa tgg agg aga agc tgc aat ggg ctg 18																			8
Leu Val Ser Gln Leu Glu Arg Glu Trp Arg Arg Ser Cys Asn Gly Leu																			
255						260													265
cca ggg cac aaa ggg cac agt agt gtg ggg gcc cct gag aca gag gcc 66																			8
Pro Gly His Lys Gly His Ser Ser Val Gly Ala Pro Glu Thr Glu Ala																			
270						275													280
																			285
ttc ctg cag cca gag agg agt cag agg ggc cca cta ctc agg gct atc 14																			9
Phe Leu Gln Pro Glu Arg Ser Gln Arg Gly Pro Leu Leu Arg Ala Ile																			
						290													295
																			300
tgg cgc gtg ttc cgg tcc acc ttc ctg ctg ggg acc ctc agc ctg gtc 62																			9
Trp Arg Val Phe Arg Ser Thr Phe Leu Leu Gly Thr Leu Ser Leu Val																			
						305													310
																			315
att agc gat gcc ttc agg ttt gct gtt ccc aag ctc ctc agt ctg ttt 10																			10
Ile Ser Asp Ala Phe Arg Phe Ala Val Pro Lys Leu Leu Ser Leu Phe																			
						320													325
																			330
ctg gag ttc atg ggt gac cgc aac tcc tcg gcg tgg aca ggc tgg ctc 58																			10
Leu Glu Phe Met Gly Asp Arg Asn Ser Ser Ala Trp Thr Gly Trp Leu																			
						335													340
																			345
cta gct gtg ctg atg ttc gcg gca gcc tgc cta cag acg ttg ttt gaa 06																			11
Leu Ala Val Leu Met Phe Ala Ala Ala Cys Leu Gln Thr Leu Phe Glu																			
350						355													360
																			365

Pxe.st25

cag cag cac atg tac aga gcc aag gtc ctg cag atg agg ctg cga aca 11
54

Gln Gln His Met Tyr Arg Ala Lys Val Leu Gln Met Arg Leu Arg Thr

370

375

380

gcc atc act ggc ctg gtg tac aga aag gtc ctg gtc ctg tcc agt ggt 12
02

Ala Ile Thr Gly Leu Val Tyr Arg Lys Val Leu Val Leu Ser Ser Gly

385

390

395

tcc aga aag tcc agc gca gca gga gac gtg gtc aac ctg gtg tcg gtg 12
50

Ser Arg Lys Ser Ser Ala Ala Gly Asp Val Val Asn Leu Val Ser Val

400

405

410

gac atc cag cgg ctg gcc gag agc atc atc tac ctc aac ggg ctg tgg 12
98

Asp Ile Gln Arg Leu Ala Glu Ser Ile Ile Tyr Leu Asn Gly Leu Trp

415

420

425

ctg ctc ttc ctg tgg atc ttt gtg tgc ttt gtc tac ctg tgg cag ctc 13
46

Leu Leu Phe Leu Trp Ile Phe Val Cys Phe Val Tyr Leu Trp Gln Leu

430

435

440

445

ctt gga ccc tct gct ctc aca gcc gtt gct gtc ttc ctg agc ctc ctc 13
94

Leu Gly Pro Ser Ala Leu Thr Ala Val Ala Val Phe Leu Ser Leu Leu

450

455

460

cct ctg aac ttc ttc atc acc aag aag agg ggc ttc cat cag gaa gaa 14
42

Pro Leu Asn Phe Phe Ile Thr Lys Lys Arg Gly Phe His Gln Glu Glu

465

470

475

Pxe.st25

cag atg agg cag aag gcc tcc aga gca cgg ctc acc agc tcc atg ctc 90	14
Gln Met Arg Gln Lys Ala Ser Arg Ala Arg Leu Thr Ser Ser Met Leu	
480 485 490	
aga act gtg aga acc atc aag tcc cac ggc tgg gag cat gcc ttc ctg 38	15
Arg Thr Val Arg Thr Ile Lys Ser His Gly Trp Glu His Ala Phe Leu	
495 500 505	
gag cga ctc ctt cac atc cgg ggc cag gag ctc agc gcc ctg aag acc 86	15
Glu Arg Leu Leu His Ile Arg Gly Gln Glu Leu Ser Ala Leu Lys Thr	
510 515 520 525	
tcc acc ctc ctc ttc tct gtg tct ctc gtg tcc ttc caa gtg tct aca 34	16
Ser Thr Leu Leu Phe Ser Val Ser Leu Val Ser Phe Gln Val Ser Thr	
530 535 540	
ttt ctg gtg gcg ctg gtc gtg ttt gct gtc cac acc ctg gtg gca gag 82	16
Phe Leu Val Ala Leu Val Val Phe Ala Val His Thr Leu Val Ala Glu	
545 550 555	
gac aat gcc atg gat gca gag aag gcc ttt gtg acg ctc aca gtg ctc 30	17
Asp Asn Ala Met Asp Ala Glu Lys Ala Phe Val Thr Leu Thr Val Leu	
560 565 570	
agc atc ctt aac aaa gcc cag gcc ttc ctc ccc ttc tct gtg cac tgc 78	17
Ser Ile Leu Asn Lys Ala Gln Ala Phe Leu Pro Phe Ser Val His Cys	

575

580

585

atc gtt cag gct cga gtg tcc ttt gac cgg ctg gct gcc ttc ctg tgc 18
26

Ile Val Gln Ala Arg Val Ser Phe Asp Arg Leu Ala Ala Phe Leu Cys

590

595

600

605

ctg gaa gaa gta gac ccc aat ggc atg atc gcg agt aac tcc agg cgc 18
74

Leu Glu Glu Val Asp Pro Asn Gly Met Ile Ala Ser Asn Ser Arg Arg

610

615

620

tcc tcg aag gat cga att tct gta cac aat ggc acc ttc gct tgg tcc 19
22

Ser Ser Lys Asp Arg Ile Ser Val His Asn Gly Thr Phe Ala Trp Ser

625

630

635

cag gag agc cca ccc tgc ctg cac ggg atc aac ctc acc gtg ccc cag 19
70

Gln Glu Ser Pro Pro Cys Leu His Gly Ile Asn Leu Thr Val Pro Gln

640

645

650

ggc tgt ctg ctg gct gtt gtg ggt cca gtg ggg gct ggg aag tcc tcc 20
18

Gly Cys Leu Leu Ala Val Val Gly Pro Val Gly Ala Gly Lys Ser Ser

655

660

665

ctg ctg tct gcc ctg ctt ggg gag ctg ttg aag gta gaa ggg tct gtg 20
66

Leu Leu Ser Ala Leu Leu Gly Glu Leu Leu Lys Val Glu Gly Ser Val

670

675

680

685

agc att gag ggt tcc gtg gct tac gtg cct cag gag gcc tgg gtc cag 21
14

Ser Ile Glu Gly Ser Val Ala Tyr Val Pro Gln Glu Ala Trp Val Gln

Pxe.st25

690	695	700	
aat acc tct gtg gcg gag aat gtg tgc ttc agg caa gag ctg gac ctg 21			
62			
Asn Thr Ser Val Ala Glu Asn Val Cys Phe Arg Gln Glu Leu Asp Leu			
705	710	715	
ccc tgg ttg cag aaa gtt cta gac gcc tgt gcc ttg ggg tct gat gtg 22			
10			
Pro Trp Leu Gln Lys Val Leu Asp Ala Cys Ala Leu Gly Ser Asp Val			
720	725	730	
gcc agc ttc cct gca gga gtt cac acc cca ata ggg gag cag ggc atg 22			
58			
Ala Ser Phe Pro Ala Gly Val His Thr Pro Ile Gly Glu Gln Gly Met			
735	740	745	
aat ctt tct ggg ggc cag aag cag cgg ctg agc ttg gct cgg gct gtg 23			
06			
Asn Leu Ser Gly Gly Gln Lys Gln Arg Leu Ser Leu Ala Arg Ala Val			
750	755	760	765
tac aaa aag gct gcc atc tac ttg ctg gat gac ccc ctg gca gcg ctg 23			
54			
Tyr Lys Lys Ala Ala Ile Tyr Leu Leu Asp Asp Pro Leu Ala Ala Leu			
770	775	780	
gat gcc cac gtc agc cag cag gtc ttc aaa cag gtc atc ggg ccc agt 24			
02			
Asp Ala His Val Ser Gln Gln Val Phe Lys Gln Val Ile Gly Pro Ser			
785	790	795	
gga ttg ctc cag ggt acg act cgg atc ctt gta aca cac acg ctg cac 24			
50			

Pxe.st25

Gly Leu Leu Gln Gly Thr Thr Arg Ile Leu Val Thr His Thr Leu His

800

805

810

gtc ctg ccc cag gct gac cgg atc ctg gtg ctg gcc aat ggg acc atc
98

24

Val Leu Pro Gln Ala Asp Arg Ile Leu Val Leu Ala Asn Gly Thr Ile

815

820

825

gca gag atg ggc tcc tac cag gac ctt ctg caa agg aac gga gcc ctg
46

25

Ala Glu Met Gly Ser Tyr Gln Asp Leu Leu Gln Arg Asn Gly Ala Leu

830

835

840

845

gtg ggt ctt ctg gat gga gcc aga cag cct gca gga aca cac gat gca
94

25

Val Gly Leu Leu Asp Gly Ala Arg Gln Pro Ala Gly Thr His Asp Ala

850

855

860

gct acc agt gac gac ctc gga ggc ttt cct gga ggt ggg agg ccc aca
42

26

Ala Thr Ser Asp Asp Leu Gly Gly Phe Pro Gly Gly Gly Arg Pro Thr

865

870

875

tgc aga cca gac agg ccc agg ccc acg gag gca gcc cct gtg aag ggc
90

26

Cys Arg Pro Asp Arg Pro Arg Pro Thr Glu Ala Ala Pro Val Lys Gly

880

885

890

agg agc aca tct gag gta cag atg gag gct tct ctg gat gac cct gag
38

27

Arg Ser Thr Ser Glu Val Gln Met Glu Ala Ser Leu Asp Asp Pro Glu

895

900

905

gcc aca gga ttg aca gca gaa gag gat agt gtg cga tat ggc cgg gtg

27

Pxe.st25

86

Ala Thr Gly Leu Thr Ala Glu Glu Asp Ser Val Arg Tyr Gly Arg Val

910

915

920

925

aag atc acc ata tac ctg agc tac ctg cgg gcg gtg ggc aca ccc ctc

34

Lys Ile Thr Ile Tyr Leu Ser Tyr Leu Arg Ala Val Gly Thr Pro Leu

28

930

935

940

tgt acc tac acc ctg ttc ctc ttc ctc tgc cag caa gtg gca tcc ttc

82

Cys Thr Tyr Thr Leu Phe Leu Phe Leu Cys Gln Gln Val Ala Ser Phe

28

945

950

955

tcc caa ggc tac tgg ctg agc ctt tgg gcc gat gac ccg gtt gtg gat

30

Ser Gln Gly Tyr Trp Leu Ser Leu Trp Ala Asp Asp Pro Val Val Asp

29

960

965

970

ggg cgg cag atg cat gca gcc ctg cgt ggc tgg gtc ttt ggg ctc ctt

78

Gly Arg Gln Met His Ala Ala Leu Arg Gly Trp Val Phe Gly Leu Leu

29

975

980

985

ggc tgt ctg caa gcc atc gga ctg ttt gcc tcc atg gct gcg gtg ttc

26

Gly Cys Leu Gln Ala Ile Gly Leu Phe Ala Ser Met Ala Ala Val Phe

30

990

995

1000

1005

ctg ggt gga gcc cgg gcc tca ggc ctc ctt ttc cgg agt ctc ctg

71

Leu Gly Gly Ala Arg Ala Ser Gly Leu Leu Phe Arg Ser Leu Leu

30

1010

1015

1020

Pxe.st25

16	tg	g	a	c	g	t	g	g	c	t	c	c	c	a	t	c	g	g	c	t	t	c	c	a	t	c	g	g	c	t	t	c	c	a	c	a	31		
	Trp	Asp	Val	Ala	Arg	Ser	Pro	Ile	Gly	Phe	Phe	Glu	Arg	Thr	Pro																								
61	g	t	c	g	g	g	a	a	c	c	t	g	c	t	g	a	a	c	c	g	t	t	t	t	c	c	a	a	g	g	a	g	a	c	a	g	t	g	31
	Val	Gly	Asn	Leu	Leu	Asn	Arg	Phe	Ser	Lys	Glu	Thr	Asp	Thr	Val																								
06	g	a	t	g	t	g	g	a	c	a	t	c	c	g	g	a	c	a	a	g	c	t	g	a	g	g	t	c	c	t	t	c	t	g	a	c	c	g	32
	Asp	Val	Asp	Ile	Pro	Asp	Lys	Leu	Arg	Ser	Leu	Leu	Thr	Tyr	Ala																								
51	t	t	t	g	g	g	c	t	c	c	t	g	g	a	g	g	t	c	c	g	t	c	g	g	c	a	g	t	g	a	c	g	a	c	c	t	g	32	
	Phe	Gly	Leu	Leu	Glu	Val	Gly	Leu	Ala	Val	Thr	Met	Ala	Thr	Pro																								
96	c	t	g	g	c	c	a	t	t	g	t	g	g	c	c	a	t	c	c	t	c	t	c	a	t	c	a	t	g	g	t	c	c	t	c	a	t	g	32
	Leu	Ala	Ile	Val	Ala	Ile	Leu	Pro	Leu	Met	Val	Leu	Tyr	Ala	Gly																								
41	t	t	t	c	a	g	a	g	c	c	t	c	t	a	t	g	t	g	g	c	a	c	a	t	c	t	t	g	c	c	a	t	c	t	g	c	a	t	33
	Phe	Gln	Ser	Leu	Tyr	Val	Ala	Thr	Ser	Cys	Gln	Leu	Arg	Arg	Leu																								
86	g	a	g	t	c	a	g	c	c	c	g	c	t	a	c	t	c	a	t	c	t	g	t	g	t	t	c	c	c	a	t	a	t	g	g	c	t	a	33
	Glu	Ser	Ala	Arg	Tyr	Ser	Ser	Val	Cys	Ser	His	Met	Ala	Glu	Thr																								

Pxe.st25

ttc cag gga agt ctg	gtg gtc agg gcc ttc	cgg gcc cag gcg tcc	34
31			
Phe Gln Gly Ser Leu	Val Val Arg Ala Phe	Arg Ala Gln Ala Ser	
	1130	1135	1140
ttc acg gct cag cac	gat gct ctc atg gat	gag aac cag agg gtc	34
76			
Phe Thr Ala Gln His	Asp Ala Leu Met Asp	Glu Asn Gln Arg Val	
	1145	1150	1155
agt ttc ccg aaa ctg	gtg gct gac agg tgg	ctg gct act aac ctg	35
21			
Ser Phe Pro Lys Leu	Val Ala Asp Arg Trp	Leu Ala Thr Asn Leu	
	1160	1165	1170
gag ctt cta ggg aat	ggc ttg gta ttc gtg	gct gct aca tgt gct	35
66			
Glu Leu Leu Gly Asn	Gly Leu Val Phe Val	Ala Ala Thr Cys Ala	
	1175	1180	1185
gtg ctg agc aag gct	cac cta agt gct ggc	ctc gtg ggc ttc tcg	36
11			
Val Leu Ser Lys Ala	His Leu Ser Ala Gly	Leu Val Gly Phe Ser	
	1190	1195	1200
gtc tcc gct gcc ctc	cag gtg aca cag act	ctg cag tgg gtg gtc	36
56			
Val Ser Ala Ala Leu	Gln Val Thr Gln Thr	Leu Gln Trp Val Val	
	1205	1210	1215
cgc agc tgg aca gat	ctg gag aac agc atg	gta gcc gtg gag cgc	37
01			
Arg Ser Trp Thr Asp	Leu Glu Asn Ser Met	Val Ala Val Glu Arg	
	1220	1225	1230

Pxe.st25

gtg cag gac tac gct	cgc atc ccc aaa gag	gct ccc tgg agg ctg	37
46			
Val Gln Asp Tyr Ala	Arg Ile Pro Lys Glu	Ala Pro Trp Arg Leu	
1235	1240	1245	
ccc acc tgc gca gcc	cag cct ctc tgg cct	tgt ggg gga cag att	37
91			
Pro Thr Cys Ala Ala	Gln Pro Leu Trp Pro	Cys Gly Gly Gln Ile	
1250	1255	1260	
gag ttc cgg gac ttt	ggg ctc aga cac cga	cca gag ctg ccc ttg	38
36			
Glu Phe Arg Asp Phe	Gly Leu Arg His Arg	Pro Glu Leu Pro Leu	
1265	1270	1275	
gct gtg cag gga gtg	tcc ctg aag atc cat	gca gga gag aag gtg	38
81			
Ala Val Gln Gly Val	Ser Leu Lys Ile His	Ala Gly Glu Lys Val	
1280	1285	1290	
ggc atc gtg ggc aga	aca ggg gcc ggg aag	tcc tcc ctg gct tgg	39
26			
Gly Ile Val Gly Arg	Thr Gly Ala Gly Lys	Ser Ser Leu Ala Trp	
1295	1300	1305	
ggc ctg ctg cgg ctt	cag gag gct gcc gag	ggt aat atc tgg atc	39
71			
Gly Leu Leu Arg Leu	Gln Glu Ala Ala Glu	Gly Asn Ile Trp Ile	
1310	1315	1320	
gat ggg gtc cct atc	acc cat gtg ggg ctg	cac aca ctg agg tcc	40
16			
Asp Gly Val Pro Ile	Thr His Val Gly Leu	His Thr Leu Arg Ser	

1325	1330	1335	
cga atc acc atc atc cct cag gac cct gtc ctg ttc cca ggc tct			40
61			
Arg Ile Thr Ile Ile Pro Gln Asp Pro Val Leu Phe Pro Gly Ser			
1340	1345	1350	
ctg cgg atg aac ctg gac ctg ctt cag gag cac aca gat gaa ggc			41
06			
Leu Arg Met Asn Leu Asp Leu Leu Gln Glu His Thr Asp Glu Gly			
1355	1360	1365	
atc tgg gca gcg ctg gag aca gtg cag ctc aag gcc ttc gtg acc			41
51			
Ile Trp Ala Ala Leu Glu Thr Val Gln Leu Lys Ala Phe Val Thr			
1370	1375	1380	
agc ctg cct ggc cag ctg caa tat gag tgt gca ggc cag gga gat			41
96			
Ser Leu Pro Gly Gln Leu Gln Tyr Glu Cys Ala Gly Gln Gly Asp			
1385	1390	1395	
gac ctg agc gtg ggt cat aaa cag ctc ctg tgc ctg gca cga gcc			42
41			
Asp Leu Ser Val Gly His Lys Gln Leu Leu Cys Leu Ala Arg Ala			
1400	1405	1410	
ctt ctc cgg aaa acc cag atc ctc atc ctg gac gag gcg act gcc			42
86			
Leu Leu Arg Lys Thr Gln Ile Leu Ile Leu Asp Glu Ala Thr Ala			
1415	1420	1425	
tct gtg gac cca ggg acg gag atg cag atg cag gcg gcc ctg gag			43
31			
Ser Val Asp Pro Gly Thr Glu Met Gln Met Gln Ala Ala Leu Glu			

Pxe.st25

1430	1435	1440	
cgc tgg ttt aca cag	tgt acc tta ctg ctt	atc gct cac cgc ctg	43
76			
Arg Trp Phe Thr Gln	Cys Thr Leu Leu Leu	Ile Ala His Arg Leu	
1445	1450	1455	
cgc tcc gtg atg gac	tgt gcc aga gtc cta	gtc atg gat gag ggg	44
21			
Arg Ser Val Met Asp	Cys Ala Arg Val Leu	Val Met Asp Glu Gly	
1460	1465	1470	
cag gtg gca gaa agt	ggc aat cct gct cag	ctg ctg gcc cag aaa	44
66			
Gln Val Ala Glu Ser	Gly Asn Pro Ala Gln	Leu Leu Ala Gln Lys	
1475	1480	1485	
ggc ctg ttt tac agg	cta gcc cat gag tcg	ggc ctc gct tga	45
08			
Gly Leu Phe Tyr Arg	Leu Ala His Glu Ser	Gly Leu Ala	
1490	1495		
atgaggattc ttaccaaccc	ccgtggagcc agccatagag	cctgcagtgg ctggagatgc	45
68			
cagagactcc aatctaaact	cctcttttggg agggagatgg	cagagaaagt gatggagtat	46
28			
tgggatacca gaccagaag	aaccagcac gccaggttg	gcctgagcaa ggccatgccc	46
88			
acccaggcc aaagagaatg	gtaactctca gcccaagctg	tctacttcaa ggccacgccc	47
48			
actccaggcc aatcagattg	gatgccctgg acccaggtga	tggtgtgcac atattcccta	48
08			
actccttatt ttgaagtc	atgtagatttc agtcacagtt	ttaagaaata acacggagag	48

68

aaactgtgac ccctctgccc tgtttattcc aagggtgaca ccttgtccaa ctctagagca 49
28

tcacaccgac tctgaccgac tcgtctttac aactccaaaa aaaaaaaaaa aa 49
80

<210> 9

<211> 1498

<212> PRT

<213> Mus musculus

<400> 9

Met Asn Ser Gly Arg Ser Met Ala Thr Pro Gly Glu Gln Cys Ala Gly
1 5 10 15

Leu Arg Val Trp Asn Gln Thr Glu Gln Glu Pro Ala Ala Tyr His Leu
20 25 30

Leu Ser Leu Cys Phe Val Arg Ala Ala Ser Ser Trp Val Pro Pro Met
35 40 45

Tyr Leu Trp Val Leu Gly Pro Ile Tyr Leu Leu Tyr Ile His Arg His
50 55 60

Gly Arg Cys Tyr Leu Arg Met Ser His Leu Phe Lys Thr Lys Met Val
65 70 75 80

Leu Gly Leu Ala Leu Ile Leu Leu Tyr Thr Phe Asn Val Ala Val Pro
85 90 95

Leu Trp Arg Ile His Gln Gly Val Pro Gln Ala Pro Glu Leu Leu Ile
100 105 110

His Pro Thr Val Trp Leu Thr Thr Met Ser Phe Ala Thr Phe Leu Ile
115 120 125

Pxe.st25

His Met Glu Arg Arg Lys Gly Val Arg Ser Ser Gly Val Leu Phe Gly
130 135 140

Tyr Trp Leu Leu Cys Cys Ile Leu Pro Gly Ile Asn Thr Val Gln Gln
145 150 155 160

Ala Ser Ala Gly Asn Leu Arg Gln Glu Pro Leu His His Leu Ala Thr
165 170 175

Tyr Leu Cys Leu Ser Leu Val Val Ala Glu Leu Val Leu Ser Cys Leu
180 185 190

Val Asp Gln Pro Pro Phe Phe Ser Glu Asp Ser Gln Pro Leu Asn Pro
195 200 205

Cys Pro Glu Ala Glu Ala Ser Phe Pro Ser Lys Ala Met Phe Trp Trp
210 215 220

Ala Ser Gly Leu Leu Trp Arg Gly Tyr Lys Lys Leu Leu Gly Pro Lys
225 230 235 240

Asp Leu Trp Ser Leu Gly Arg Glu Asn Ser Ser Glu Glu Leu Val Ser
245 250 255

Gln Leu Glu Arg Glu Trp Arg Arg Ser Cys Asn Gly Leu Pro Gly His
260 265 270

Lys Gly His Ser Ser Val Gly Ala Pro Glu Thr Glu Ala Phe Leu Gln
275 280 285

Pro Glu Arg Ser Gln Arg Gly Pro Leu Leu Arg Ala Ile Trp Arg Val
290 295 300

Phe Arg Ser Thr Phe Leu Leu Gly Thr Leu Ser Leu Val Ile Ser Asp
305 310 315 320

Pxe.st25

Ala Phe Arg Phe Ala Val Pro Lys Leu Leu Ser Leu Phe Leu Glu Phe
325 330 335

Met Gly Asp Arg Asn Ser Ser Ala Trp Thr Gly Trp Leu Leu Ala Val
340 345 350

Leu Met Phe Ala Ala Ala Cys Leu Gln Thr Leu Phe Glu Gln Gln His
355 360 365

Met Tyr Arg Ala Lys Val Leu Gln Met Arg Leu Arg Thr Ala Ile Thr
370 375 380

Gly Leu Val Tyr Arg Lys Val Leu Val Leu Ser Ser Gly Ser Arg Lys
385 390 395 400

Ser Ser Ala Ala Gly Asp Val Val Asn Leu Val Ser Val Asp Ile Gln
405 410 415

Arg Leu Ala Glu Ser Ile Ile Tyr Leu Asn Gly Leu Trp Leu Leu Phe
420 425 430

Leu Trp Ile Phe Val Cys Phe Val Tyr Leu Trp Gln Leu Leu Gly Pro
435 440 445

Ser Ala Leu Thr Ala Val Ala Val Phe Leu Ser Leu Leu Pro Leu Asn
450 455 460

Phe Phe Ile Thr Lys Lys Arg Gly Phe His Gln Glu Glu Gln Met Arg
465 470 475 480

Gln Lys Ala Ser Arg Ala Arg Leu Thr Ser Ser Met, Leu Arg Thr Val
485 490 495

Arg Thr Ile Lys Ser His Gly Trp Glu His Ala Phe Leu Glu Arg Leu
500 505 510

Pxe.st25

Leu His Ile Arg Gly Gln Glu Leu Ser Ala Leu Lys Thr Ser Thr Leu
515 520 525

Leu Phe Ser Val Ser Leu Val Ser Phe Gln Val Ser Thr Phe Leu Val
530 535 540

Ala Leu Val Val Phe Ala Val His Thr Leu Val Ala Glu Asp Asn Ala
545 550 555 560

Met Asp Ala Glu Lys Ala Phe Val Thr Leu Thr Val Leu Ser Ile Leu
565 570 575

Asn Lys Ala Gln Ala Phe Leu Pro Phe Ser Val His Cys Ile Val Gln
580 585 590

Ala Arg Val Ser Phe Asp Arg Leu Ala Ala Phe Leu Cys Leu Glu Glu
595 600 605

Val Asp Pro Asn Gly Met Ile Ala Ser Asn Ser Arg Arg Ser Ser Lys
610 615 620

Asp Arg Ile Ser Val His Asn Gly Thr Phe Ala Trp Ser Gln Glu Ser
625 630 635 640

Pro Pro Cys Leu His Gly Ile Asn Leu Thr Val Pro Gln Gly Cys Leu
645 650 655

Leu Ala Val Val Gly Pro Val Gly Ala Gly Lys Ser Ser Leu Leu Ser
660 665 670

Ala Leu Leu Gly Glu Leu Leu Lys Val Glu Gly Ser Val Ser Ile Glu
675 680 685

Gly Ser Val Ala Tyr Val Pro Gln Glu Ala Trp Val Gln Asn Thr Ser
690 695 700

Pxe.st25

Val Ala Glu Asn Val Cys Phe Arg Gln Glu Leu Asp Leu Pro Trp Leu
705 710 715 720

Gln Lys Val Leu Asp Ala Cys Ala Leu Gly Ser Asp Val Ala Ser Phe
725 730 735

Pro Ala Gly Val His Thr Pro Ile Gly Glu Gln Gly Met Asn Leu Ser
740 745 750

Gly Gly Gln Lys Gln Arg Leu Ser Leu Ala Arg Ala Val Tyr Lys Lys
755 760 765

Ala Ala Ile Tyr Leu Leu Asp Asp Pro Leu Ala Ala Leu Asp Ala His
770 775 780

Val Ser Gln Gln Val Phe Lys Gln Val Ile Gly Pro Ser Gly Leu Leu
785 790 795 800

Gln Gly Thr Thr Arg Ile Leu Val Thr His Thr Leu His Val Leu Pro
805 810 815

Gln Ala Asp Arg Ile Leu Val Leu Ala Asn Gly Thr Ile Ala Glu Met
820 825 830

Gly Ser Tyr Gln Asp Leu Leu Gln Arg Asn Gly Ala Leu Val Gly Leu
835 840 845

Leu Asp Gly Ala Arg Gln Pro Ala Gly Thr His Asp Ala Ala Thr Ser
850 855 860

Asp Asp Leu Gly Gly Phe Pro Gly Gly Gly Arg Pro Thr Cys Arg Pro
865 870 875 880

Asp Arg Pro Arg Pro Thr Glu Ala Ala Pro Val Lys Gly Arg Ser Thr
885 890 895

Pxe.st25

Ser Glu Val Gln Met Glu Ala Ser Leu Asp Asp Pro Glu Ala Thr Gly
 900 905 910

Leu Thr Ala Glu Glu Asp Ser Val Arg Tyr Gly Arg Val Lys Ile Thr
 915 920 925

Ile Tyr Leu Ser Tyr Leu Arg Ala Val Gly Thr Pro Leu Cys Thr Tyr
 930 935 940

Thr Leu Phe Leu Phe Leu Cys Gln Gln Val Ala Ser Phe Ser Gln Gly
 945 950 955 960

Tyr Trp Leu Ser Leu Trp Ala Asp Asp Pro Val Val Asp Gly Arg Gln
 965 970 975

Met His Ala Ala Leu Arg Gly Trp Val Phe Gly Leu Leu Gly Cys Leu
 980 985 990

Gln Ala Ile Gly Leu Phe Ala Ser Met Ala Ala Val Phe Leu Gly Gly
 995 1000 1005

Ala Arg Ala Ser Gly Leu Leu Phe Arg Ser Leu Leu Trp Asp Val
 1010 1015 1020

Ala Arg Ser Pro Ile Gly Phe Phe Glu Arg Thr Pro Val Gly Asn
 1025 1030 1035

Leu Leu Asn Arg Phe Ser Lys Glu Thr Asp Thr Val Asp Val Asp
 1040 1045 1050

Ile Pro Asp Lys Leu Arg Ser Leu Leu Thr Tyr Ala Phe Gly Leu
 1055 1060 1065

Leu Glu Val Gly Leu Ala Val Thr Met Ala Thr Pro Leu Ala Ile
 1070 1075 1080

Pxe.st25

Val	Ala	Ile	Leu	Pro	Leu	Met	Val	Leu	Tyr	Ala	Gly	Phe	Gln	Ser
1085						1090					1095			
Leu	Tyr	Val	Ala	Thr	Ser	Cys	Gln	Leu	Arg	Arg	Leu	Glu	Ser	Ala
1100						1105					1110			
Arg	Tyr	Ser	Ser	Val	Cys	Ser	His	Met	Ala	Glu	Thr	Phe	Gln	Gly
1115						1120					1125			
Ser	Leu	Val	Val	Arg	Ala	Phe	Arg	Ala	Gln	Ala	Ser	Phe	Thr	Ala
1130						1135					1140			
Gln	His	Asp	Ala	Leu	Met	Asp	Glu	Asn	Gln	Arg	Val	Ser	Phe	Pro
1145						1150					1155			
Lys	Leu	Val	Ala	Asp	Arg	Trp	Leu	Ala	Thr	Asn	Leu	Glu	Leu	Leu
1160						1165					1170			
Gly	Asn	Gly	Leu	Val	Phe	Val	Ala	Ala	Thr	Cys	Ala	Val	Leu	Ser
1175						1180					1185			
Lys	Ala	His	Leu	Ser	Ala	Gly	Leu	Val	Gly	Phe	Ser	Val	Ser	Ala
1190						1195					1200			
Ala	Leu	Gln	Val	Thr	Gln	Thr	Leu	Gln	Trp	Val	Val	Arg	Ser	Trp
1205						1210					1215			
Thr	Asp	Leu	Glu	Asn	Ser	Met	Val	Ala	Val	Glu	Arg	Val	Gln	Asp
1220						1225					1230			
Tyr	Ala	Arg	Ile	Pro	Lys	Glu	Ala	Pro	Trp	Arg	Leu	Pro	Thr	Cys
1235						1240					1245			
Ala	Ala	Gln	Pro	Leu	Trp	Pro	Cys	Gly	Gly	Gln	Ile	Glu	Phe	Arg
1250						1255					1260			

Pxe.st25

Asp	Phe	Gly	Leu	Arg	His	Arg	Pro	Glu	Leu	Pro	Leu	Ala	Val	Gln
1265						1270					1275			
Gly	Val	Ser	Leu	Lys	Ile	His	Ala	Gly	Glu	Lys	Val	Gly	Ile	Val
1280						1285					1290			
Gly	Arg	Thr	Gly	Ala	Gly	Lys	Ser	Ser	Leu	Ala	Trp	Gly	Leu	Leu
1295						1300					1305			
Arg	Leu	Gln	Glu	Ala	Ala	Glu	Gly	Asn	Ile	Trp	Ile	Asp	Gly	Val
1310						1315					1320			
Pro	Ile	Thr	His	Val	Gly	Leu	His	Thr	Leu	Arg	Ser	Arg	Ile	Thr
1325						1330					1335			
Ile	Ile	Pro	Gln	Asp	Pro	Val	Leu	Phe	Pro	Gly	Ser	Leu	Arg	Met
1340						1345					1350			
Asn	Leu	Asp	Leu	Leu	Gln	Glu	His	Thr	Asp	Glu	Gly	Ile	Trp	Ala
1355						1360					1365			
Ala	Leu	Glu	Thr	Val	Gln	Leu	Lys	Ala	Phe	Val	Thr	Ser	Leu	Pro
1370						1375					1380			
Gly	Gln	Leu	Gln	Tyr	Glu	Cys	Ala	Gly	Gln	Gly	Asp	Asp	Leu	Ser
1385						1390					1395			
Val	Gly	His	Lys	Gln	Leu	Leu	Cys	Leu	Ala	Arg	Ala	Leu	Leu	Arg
1400						1405					1410			
Lys	Thr	Gln	Ile	Leu	Ile	Leu	Asp	Glu	Ala	Thr	Ala	Ser	Val	Asp
1415						1420					1425			
Pro	Gly	Thr	Glu	Met	Gln	Met	Gln	Ala	Ala	Leu	Glu	Arg	Trp	Phe
1430						1435					1440			

Pxe.st25

Thr Gln Cys Thr Leu Leu Leu Ile Ala His Arg Leu Arg Ser Val
1445 1450 1455

Met Asp Cys Ala Arg Val Leu Val Met Asp Glu Gly Gln Val Ala
1460 1465 1470

Glu Ser Gly Asn Pro Ala Gln Leu Leu Ala Gln Lys Gly Leu Phe
1475 1480 1485

Tyr Arg Leu Ala His Glu Ser Gly Leu Ala
1490 1495

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Pxe.st25

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